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ABSTRACT

A study was conducted to assess the extent to which instructional technology has been adopted in secondary programs of agricultural education in the United States. Teachers from 479 secondary agriculture programs were randomly selected to provide responses to a mailed survey instrument requesting information about types and quantity of equipment, level of current use, level of planned future use, future needs, and barriers to using existing technology. Usable replies were received from 254 teachers (a 53 percent response rate). Some of the findings were as follows: (1) a majority of the respondents had an overhead projector (80 percent), a microcomputer (73 percent), a slide projector (67 percent), a printer (66 percent), a filmstrip projector (61 percent), and an audiocassette player (56 percent) in their agriculture departments; (2) more than 50 percent of the programs had Apple II or compatible machines; (3) 17 percent of the respondents subscribed to Agri-Data Network; (4) overhead projectors, carousel slide projectors, and videotape players were most frequently used for group instruction; (5) instructors anticipate using the newer technology more frequently in the future; (6) teachers supported the development of technological advances for use in their curriculum; and (7) lack of funds was the most often-cited barrier to use of educational technology. Recommendations were made for teachers to identify ways of increasing funding for technology use and to receive inservice education to develop their expertise in educational technologies. (KC)

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USE OF EDUCATIONAL TECHNOLOGY IN AGRICULTURAL EDUCATION: A NATIONAL STUDY

Project Final Report

submitted to the

National FFA Board of Directors

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USE OF EDUCATIONAL TECHNOLOGY IN AGRICULTURAL EDUCATION: A NATIONAL STUDY

Introduction

Instructional technology has become increasingly available for use by high school agriculture teachers. Technological developments have contributed significantly to the acquisition and use of microcomputers in educational settings. VCRs, camcorders, satellite receivers, and computer modems have also become available for use in high school agricultural education programs.

Theoretical Framework

A review of literature revealed that educational technology and its application in the classroom is of crucial importance to educators and those with an interest in education. This is the case when considering the general as well as the agricultural classroom. McCarney (1987) advocated shifting education from a labor-intensive emphasis to a capital-intensive emphasis and indicated that this could best be accomplished through the classroom use of technology such as computers and video cassette recorders. Others have suggested that educational technology should support and empower the learner. Wedman (cited in Mihalevich, 1989) also presented several scenarios which illustrate the importance of educational technology in the 1990s. These scenarios were presented as possible outcomes based on current trends such as the following:

> Projections are that costs of education will continue to rise. Funding agencies will demand a "return on investment" mentally. Implication: Educational technology processes and products will be the primary alternative for labor-intensive instructional systems in an effort to hold down costs of education and training.
>
> Communication technologies will become more powerful. Implication: Educational technology in schools will provide a window to the world.

> Nationally we will spend more on computer-assisted instruction than on textbooks. Implication: Educational technology will be an integral part of the move away from school-based systems and toward high-tech, consumer-based learning systems.
>
> The input devices of today will give way to better methods of tomorrow. Implication: Educational technology will replace the keyboard and mouse with voice-activated input.
>
> Schools will continue to adapt -- rather than adopt -- educational innovations. Implication: Educational policy-makers will become more concerned about the fidelity of program implementation, especially those involving educational technology products. (p. 3)

He left little question that teaching technology is one of the most important considerations educators will face in the 1990s. "Educational technology shouldn't be viewed as an add-on approach to teaching strategies. It should be seen as an integral part of those strategies" (p. 3).

Keeping up with technological change was cited as one of the most difficult challenges facing vocational education. Rosenfeld (1986) suggested that keeping up with technology is like chasing a moving target and noted problems in readjusting programs and obtaining needed equipment.

> Supporters of vocational agriculture have agreed upon the need for expanded programs and better resources in the high schools and on the importance of science, technology, and problem-solving in the curriculum (p. 10).

And in 1984, legislation was enacted that:

> for the first time, explicitly addressed and responded to the impacts of technological change. Technology was no longer treated as an unseen force acting on labor market demand, but as a force with known dimensions that should be factored into vocational education instructional policies (p. 13).

Previous literature has placed significant emphasis on the microcomputer in educational technology. While many aspects of high technology may be directly applicable in agricultural education classrooms, the primary thrust will likely be centered around microcomputers. Because of cost and availability,

microcomputers will continue to play an increasingly important role in agricultural education (Camp, 1983).

Research was completed in North Dakota to identify successful microcomputer activities which had been used in vocational agriculture instruction in that state (Zidon & Luft, 1986). The following conclusions were reported:

> 1. Nearly all North Dakota vocational agriculture teachers could have used microcomputers within their programs. Most had microcomputers within their departments, others had them available in other departments of the school. Printers and extra disk drives were the most predominant type of microcomputer peripheral available in the departments.
>
> 2. Microcomputers were being used in all units of instruction by one or more teachers. They were used most to work decision aids and tutorial programs in such units as farm business management, SOE, animal nutrition, FFA leadership, and advanced crop science.
>
> 3. Teachers perceived the use of microcomputers for instructional purposes to be effective. It was identified as being most effective for teaching farm business management, perhaps because of the decision aid programs available.
>
> 4. Microcomputers were used by many teachers for non-instructional purposes. Activities which received most frequent microcomputer use included word processing, correspondence, entertainment, and generating tests (p. 55-56).

Another study gathered data to determine the type and level of microcomputer use in vocational agriculture programs across the United States (Miller & Kotrlik, 1986). The following conclusions were reported:

> 1. The percentage of teachers who have computers in their vocational agriculture departments does not appear to be as high as the percentage reported by the National FFA Agricultural Computing Service (1985) which reported that 51 percent of the programs in the nation had computers. This study found that only 39 percent of the teachers in the sample had computers.
>
> 2. Computers currently in vocational agriculture programs are used more for instructional management (as a tool) than they are for tutorial or direct instructional purposes. Existing research findings on how to effectively incorporate the computer into the instructional environment should be used by teacher educators and state supervisors to aid teachers in using the computer to improve instructional effectiveness (p. 173).

A recent study examined tutorial, drill-and-practice, and simulation teaching strategies when microcomputers were used to incorporate information in the classroom setting (Birkenholz, Stewart, McCaskey, Ogle, & Linhardt, 1988). The study collected data from 312 students from 31 randomly selected agriculture classes in Missouri secondary schools. Conclusions reached included: Student attitudes did not vary when they were taught with one of the three microcomputer-enhanced strategies or a traditional lecture/discussion strategy. Also, student achievement was not found to be significantly affected when microcomputers were used to enhance instruction. Among the recommendations made by the writers were the following: Microcomputer-enhanced teaching strategies may be used to supplement or replace a portion of the traditional classroom instruction, which would enable teachers to spend more time attending to students' individual needs and successful microcomputer-assisted instruction can take place in the classroom using the three strategies studied.

A review of previous literature revealed that educational technology is vitally important, yet there are many unanswered questions related to this dynamic area in secondary agriculture programs in the United States.

Need for the Study

Several studies and reports have described the use of instructional technology in high schools. The Office of Educational Research and Improvement (1986) in the U.S. Department of Education reported that 99% of all public high schools in the United States have purchased microcomputers. However, a study by the National FFA Agricultural Computing Service (1985) reported that only 51% of the secondary agricultural education programs had microcomputers.

Foster and Miller (1985), Henderson (1985), and Malpiedi, Papritan and Lichtensteiger (1985) completed studies which surveyed vocational agriculture

educators concerning the use of microcomputers. These studies indicated that further research was necessary regarding the use of microcomputers in programs of agriculture. In addition, Lockheed and Mandinach (1986) reported that the trend in secondary schools has shifted from computer programming courses toward an emphasis on applications-based courses.

Emphasis has been placed on the need to prepare students who are literate in a technological sense. Barbour (1984) reported that there was increased emphasis on the integration of computers in the curriculum, especially in the ninth through the twelfth grades. He further noted that several states have mandated that students develop computer literacy skills as part of the secondary school curriculum. In 1982, the development of computer literacy was the primary use of microcomputers in secondary classrooms. However, a recent report has identified enrichment as the principal use of microcomputers in educational settings, followed by computer literacy and remediation (Office of Educational Research and Improvement, 1986).

Edward R. Murrow (cited in Cline and Anderson, 1984) writing about the potential for using television for educational purposes, noted that, "This instrument can teach, it can illuminate; yes it can even inspire. But it can do so only to the extent that humans are determined to use it to those ends. Otherwise it is merely lights and wires in a box" (p. 39).

Although this statement was made in reference to the development of television media, the message might also have been written in recent years regarding the introduction of microcomputers and related equipment. Educational planners must focus on how newly-developed technologies will be used in classrooms of the future.

Although subject to revision, current plans may provide an indication of how teachers anticipate using new technology in the years to come. An

understanding of the intentions of teachers was judged to be useful information for policy makers attempting to facilitate the infusion of educational technology in the classrooms of tomorrow. This study was designed to document the status and to project the use of instructional technology in high school agriculture programs. Information gained as a result of this study should be particularly beneficial in the development of curriculum and FFA program materials to incorporate new instructional technologies which will be used in secondary agriculture programs.

Purposes and Objectives

The purpose of this project was to assess the extent to which instructional technology has been adopted and utilized in secondary programs of agricultural education in the United States. More specifically, this project was designed to fulfill the following objectives:

1. To identify and document the types and quantity of instructional technology available in high school agricultural education programs.
2. To assess the current use of instructional technology in high school agricultural education programs.
3. To ascertain future plans for using instructional technology in high school agricultural education programs.
4. To ascertain the instructional technology needs of high school agricultural education programs in terms of equipment, software, curriculum materials, and on-line computer services.
5. To identify barriers which inhibit greater use of instructional technology in high school agriculture programs.

Procedures

The population for this research was all secondary agricultural education instructors in the United States. Stratified, proportional, random sampling procedures were employed to identify agriculture programs to provide information needed to fulfill the objectives. The population was stratified to provide input from each of the 50 states. Teachers from 479 secondary agriculture programs were randomly selected to provide responses to a mailed survey instrument. An instrument and cover letter were sent to each selected instructor. Those who did not respond within two weeks were sent a reminder postcard to encourage their response. Five weeks after the postcards were sent a second letter and instrument were sent to those instructors who had not responded. Finally, a follow-up phone call was made to a 10 percent random sample of nonrespondents.

The instrument requested information in the following areas: (a) types and quantity of equipment; (b) level of current use; (c) level of use planned for the future; (d) future needs for equipment, software, materials, training, and on-line computer services; and (e) barriers to using existing technology. A pilot test was conducted using members of the population which were not selected as part of the sample. Instrument validity was assessed by a panel of experts including specialists in Agricultural Education and Instructional Technology. Instrument reliability was estimated by calculating a Cronbach's alpha reliability coefficient.

Analysis of Data

The data collected were analyzed using descriptive statistics. T-tests were run on data from the respondents and non-respondents on selected dependent

variables to ascertain if the respondents were representative of the population. ANOVA tests were used to identify differences in the current and anticipated level of use of instructional technology for administration and planning, group instruction, and individual instruction.

Results

Usable data collection instruments were received from 254 secondary agriculture teachers for a response rate of 53 percent. As a result of comparing the data collected from 254 respondents and 19 non-respondents, it was found that there were not significant differences between the groups on the inventory of equipment or the use of traditional equipment such as the overhead projector. However, significant differences were found among the groups on the current use of microcomputers and their related peripherals. Therefore, it was judged that the findings related to the use of microcomputers should be limited to those instructors who provided usable data, and not be generalized to the population from which the sample was drawn.

The overall reliability estimate for the sections of the instrument related to the current and anticipated use of educational technology was .98.

The first objective was to identify and document the types and quantity of instructional technology available in high school programs of agriculture. These data are presented in Tables 1, 2, and 3. Table 1 presents the percent of agriculture departments and schools reporting selected items of instructional equipment as well as the mean number of machines in inventory in those programs with equipment. As noted in Table 1, 73 percent of the agriculture departments have microcomputers as contrasted to 85 percent of the schools. Sixty-six percent have microcomputer printers contrasted to 82 percent of the schools. In addition, as a point of reference, 80 percent of the departments and schools

Table 1

Inventory of instructional equipment in agriculture departments and schools (N = 254)

Equipment	Agriculture Departments			Schools		
	n	%	$\bar{X}$ inventory	n	%	$\bar{X}$ inventory
Microcomputer	185	72.8	2.47	216	85.0	32.0
Microcomputer modem	66	26.0	1.6	95	37.4	4.5
Microcomputer printer	168	66.1	1.7	209	82.3	15.4
Overhead computer projection unit	16	6.3	1.1	59	23.2	2.8
Amplified telephone	21	8.3	1.1	55	21.7	6.2
VCR player/recorder	90	35.4	1.4	208	81.9	5.6
VCR camera	50	19.7	1.5	208	81.9	2.5
Satellite receiver dish	7	2.8	1.1	39	15.4	1.1
Interactive video	10	3.9	1.1	52	20.5	2.2
Carousel slide projector	170	66.9	1.2	202	79.6	7.8
Overhead projector	204	80.3	1.4	202	79.6	16.8
Audio-cassette player	141	55.5	1.6	185	72.8	11.0
16mm film projector	120	47.2	1.2	204	80.3	7.7
Film strip projector	154	60.6	1.5	195	76.8	9.4
Opaque projector	45	17.7	1.3	189	74.4	2.8
Large screen TV	26	10.2	1.2	61	24.0	3.2

*Means are for the departments/schools reporting equipment in inventory.

reported availability of overhead projectors. Table 2 presents the inventory of microcomputers by brand and the type of disk drives available in agriculture departments and schools. Over half of the programs (53.5 percent) have Apple machines. The inventory of other machines was distributed among the major brands. Seventy-seven percent of the departments reported having 5.25 inch disk drives while 36 percent had 3.5 inch drives and 9 percent had hard disk drives. Table 3 identifies information services that can be accessed by microcomputers. AgriData, at 17 percent, was the most commonly listed information source followed by DataLine at 4 percent.

The second and third objectives were to assess the current and anticipated use of instructional technology in high school programs of agriculture. Table 4 presents the data of current and anticipated use of various types of instructional equipment for administration and planning purposes, for group instruction, and for individual instruction. The results of the analysis of variance test to check for significant differences between current and anticipated use of the various technologies is also presented. As noted in Table 4, teachers anticipate increased use of all the equipment for administration and planning purposes. They also anticipated increased use of the more recently developed technology but no change in the use of traditional equipment for group instructional purposes. However, the equipment they anticipated using most would include the VCR player/recorder and camera, the microcomputer and related peripherals, the carousel slide projector, and the overhead projector. The respondents also anticipate using the newer technology to a greater extent for individual instructional purposes. They anticipate using the microcomputer and the VCR recorder most often for individual instruction. However, major changes were not anticipated in the use of other pieces of equipment for individual instructional purposes.

Table 2

Inventory of microcomputers and disk drives in agriculture departments and schools (N = 254)

Microcomputers	Agriculture Departments			Schools		
	n	%	$\bar{X}$ inventory	n	%	$\bar{X}$ inventory
IBM (i.e. PC, Model 30, etc.)	27	10.6	3.1	114	44.9	12.2
IBM compatible (Zenith, Tandy 1000, etc.)	18	7.1	3.0	45	17.7	9.0
Apple II, II+, IIe, IIc	136	53.5	2.26	177	69.7	21.4
Apple II-GS	19	7.5	3.4	63	24.8	6.8
Apple compatible (i.e. Franklin, etc.)	8	3.1	2.0	11	4.3	6.0
Radio Shack	20	7.9	3.8	47	18.5	12.0
Commodore	3	1.2	1.3	29	11.4	6.1
Other brands	4	1.6	1.3	11	4.3	7.1
Disk drives:						
3.5 inch	66	26.0	1.5	115	45.3	10.6
5.25 inch	143	56.3	3.1	151	59.4	17.8
Hard disk	17	6.7	1.4	71	28.0	2.4

*Means are for the departments/schools reporting equipment in inventory.

Table 3

Percent of agriculture departments that subscribe to the following information services

Data base	%
AgriData	17
AGNET	2
AgLine	2
ACRES	1
Grassroots	0
Data-Line	4
RFD-TV	0
CompuServe	2
The Source	1
USDA Online	0
Instant Update	0
CMN	0
AgriStar	1
TELPLAN	0
Other	4

Table 4

Means and comparisons of current and anticipated use of instructional technology in agriculture departments

Item	Currently use $\bar{X}$	Anticipate using $\bar{X}$	F	p
	For administration and planning			
Microcomputer	3.26a	3.83a	32.95	.01
Microcomputer modem	1.64	2.54	71.96	.01
Microcomputer printer	3.31	3.82	24.34	.01
Conference telephone	1.38	1.80	25.72	.01
VCR player/recorder	3.27	3.68	24.52	.01
VCR camera	2.26	3.09	70.07	.01
Satellite receiver dish (downlink)	1.16	1.76	53.93	.01
Interactive video	1.17	1.60	32.80	.01
Audio-cassette player	1.17	1.60	32.80	.01
	For group instruction			
Microcomputer	2.72	3.44	56.04	.01
Microcomputer modem	1.58	2.36	65.80	.01
Microcomputer printer	2.84	3.40	29.11	.01
Overhead computer projection unit	1.55	2.33	49.60	.01
Amplified telephone	1.14	1.45	32.34	.01
VCR player/recorder	3.16	3.67	38.65	.01
VCR camera	2.32	3.11	56.08	.01
Satellite receiver dish (downlink)	1.18a	1.75a	52.41	.01

aResponses were coded: 1 = never, 5 = always

Table 4 (continued)

Item	Currently use $\bar{X}$	Anticipate using $\bar{X}$	F	p
	For group instruction (continued)			
Interactive video	1.18	1.57	29.94	.01
Carousel slide projector	3.28	3.36	.92	.34
Overhead projector	3.37	3.43	.42	.52
Audio-cassette player	2.85	2.88	.12	.73
Filmstrip projector	2.93	2.94	.02	.88
16mm film projector	2.80	2.83	.15	.70
Opaque projector	1.65	1.68	.24	.63
	For individual instruction			
Microcomputer	2.91	3.62	50.91	.01
Microcomputer modem	1.65	2.40	50.61	.01
Microcomputer printer	2.82	3.41	34.55	.01
VCR player/recorder	2.68	3.21	27.83	.01
VCR camera	2.14	2.78	32.93	.01
Satellite receiver dish (downlink)	1.22	1.64	27.26	.01
Interactive video	1.19	1.54	25.76	.01
Carousel slide projector	2.71	2.87	3.15	.08
Overhead projector	2.39	2.46	.42	.52
Audio-cassette player	2.52	2.62	1.05	.31
Filmstrip projector	2.54	2.56	.03	.87

[a]Responses were coded: 1 = never, 5 = always

Table 5 presents the extent to which educational materials were used in secondary agriculture programs. Wordprocessing packages appeared to be the most commonly used type of material with telecommunications packages being used the least.

Objective four was to ascertain the instructional technology needs of high school agricultural education programs in terms of equipment, software, materials, and data base information services. Tables 6 and 7 present this information. In Table 6, teachers indicated that a computer accessed data base information system should provide lesson plans (80 percent), agricultural markets (66 percent), news reports (60 percent), and instant access to information (73 percent). It was noted that only 22 percent indicated they would support an hourly connection fee. When asked to indicate the types of materials to be included in future curriculum materials, teachers indicated, as reported in Table 7, they would like to see a guide with lesson plans, evaluation materials, videotapes, student references, assignment sheets, transparency masters, directions for lab activities, computer software, and competency lists (all supported by 75 percent or more of the respondents).

The fifth objective was to identify barriers which inhibit greater use of instructional technology in high school agriculture programs. These data are presented in Tables 8 and 9. Table 8 addresses what teachers consider to be a reasonable price they would be willing to pay for selected instructional materials. Nine percent indicated they would be willing to pay over $100 for one piece of equipment, that being a word processing package. The majority of responses were in the under $50 category.

When asked to list barriers to the use of educational technology (Table 9), lack of funds was the most often cited reason preventing the use of the newer technologies. Most notably, 51 percent indicated a lack of funds would be a

Table 5

Extent to which educational materials are used in secondary agriculture programs

Material	Use $\bar{X}$
Spreadsheet package(s)	2.34a
Word processing package(s)	3.04
Data base management package(s)	2.24
Telecommunications package(s)	1.47
Presentation graphics	1.83
Tutorial programs	2.27
Drill and practice programs	2.32
Simulation programs	2.23
Decision aid programs	2.18
Grade book programs	2.34
Test item bank programs	2.24
Videotapes	3.33
Information data base services	1.67
Film strips	2.91
Audio-cassette tapes	2.69
Transparencies	3.12
Slides	3.16
16mm films	2.84

Table 6

Percent of agriculture teachers preferring selected features of a computer accessed data base information system

Feature	%
Lesson plans	80
Annual fee	46
Monthly fee	15
Hourly connection fee	22
Agricultural markets	66
News reports	60
Instant access to information	73
Other	2

Table 7

Percent of agriculture teachers preferring selected types of instructional materials

Material	%
Instructor's guide with lesson plans	93
Evaluation materials (tests and quizzes)	89
Videotapes	83
Student references	84
Assignment sheets	83
Audio-cassette tapes	56
Transparency masters	89
Directions for lab activities	88
Computer software	82
Slide sets	69
Competency lists	76
16mm films	43
Film strips	51
Other materials	3

Table 8

Agriculture teacher responses to a reasonable price range for materials

Material	$0-50 %	$51-100 %	$100+ %	No response %
Spreadsheet package(s)	42	21	7	30
Word processing package(s)	37	27	9	27
Data base management package(s)	36	27	7	30
Telecommunications package(s)	31	20	6	43
Presentation graphics	36	22	3	39
Tutorial programs	52	16	0	32
Drill & practice programs	59	11	0	30
Simulation programs	47	18	1	34
Decision aid programs	43	20	2	35
Grade book programs	53	12	1	34
Test item bank programs	50	16	1	33
Videotapes	61	19	1	19
Information data base services	45	10	2	43
Film strips	70	7	0	23
Audio-cassette tapes	69	5	1	25
Transparencies	71	4	0	25
Slides (2" x 2") (set of 80)	61	16	1	22
16mm films	49	18	3	30

Table 9

Percent of agriculture teacher responses to barriers in utilizing educational technology

Equipment	Lack of $ %	Lack of expertise %	Technology outdated %	Lack of materials %	No interest %	Unaware of technology %	Materials outdated %	Other %
Microcomputer	51	29	2	30	4	5	3	6
Microcomputer modem	59	27	1	5	10	6	2	6
Microcomputer printer	42	15	2	10	4	2	4	4
Overhead computer projection screen	63	12	0	4	11	8	1	3
Amplified telephone	46	15	0	2	26	17	0	4
VCR player/recorder	37	1	0	8	0	0	2	4
VCR camera	50	5	0	2	4	2	1	4
Satellite receiver dish (downlink)	67	11	1	3	14	8	1	3
Interactive video	51	17	0	2	16	20	1	2
Carousel slide projector	18	0	5	7	2	0	12	4
Audio cassette player	15	1	7	7	6	1	11	4
Filmstrip projector	17	1	11	5	4	0	14	4
Opaque projector	15	2	17	2	19	2	8	3
16mm film projector	17	0	13	8	2	1	13	6

problem in utilizing microcomputers, 59 percent for modems, 67 percent for satellite receiver dishes, and 51 percent for interactive video. When the use of microcomputers specifically was examined, 29 percent indicated a lack of expertise in using the computer, 27 percent a lack of expertise in using the modem, and 30 percent indicated a lack of materials and software to support the equipment.

Findings

The following statements reflect the major findings which resulted from this study:

1. A majority of the respondents had an overhead projector (80%), a microcomputer (73%), a carousel slide projector (67%), a printer (66%), a film strip projector (61%), and an audio-cassette player (56%) in the inventory of educational equipment in the agriculture department (Table 1).

2. Over 50 percent of the secondary agriculture programs had Apple II or compatible machines (Table 2).

3. Seventeen percent of the respondents subscribed to Agri-Data Network (Table 3).

4. Overhead projectors, carousel slide projectors, and VCR players/recorders were most frequently used for group instructional purposes (Table 4).

5. Instructors reported they anticipate using the newer technologies more frequently for group instructional purposes. Specifically, instructors indicated they planned to use microcomputers and printers, overhead projectors, carousel slide projectors, and VCR players/recorders most frequently for group instruction (Table 4).

6. Instructors responding to this survey anticipated using VCR players/recorders and cameras, and microcomputers and related peripherals most often for individual instructional purposes (Table 4).

7. Instructors responding to this survey indicated that word processing programs were the most frequently used type of computer software, and telecommunications programs were used the least (Table 5).

8. Videotapes were the most frequently used form of audio-visual materials followed by slide sets and transparencies (Table 5).

9. The majority of teachers reported that a computerized data base should provide lesson plans, instant access to information, agricultural markets, and news reports (Table 6).

10. Instructors strongly supported the development of a variety of support materials in future curriculum projects (Table 7).

11. The greatest barrier to the potential use of educational technology was a lack of funds (Table 9).

12. A lack of expertise and available software materials were perceived as barriers to the use of microcomputers by those responding to this study (Table 9).

Conclusions

1. Agriculture departments do not maintain a state of the art inventory of instructional equipment.

2. Apple compatible machines are the type most available for use in programs of agriculture followed by IBM compatible machines. However, the difference in operating systems within these groups of machines presents a challenge in preparing programs for use by teachers.

3. Departmental control of instructional equipment does not appear to be a major factor governing its use for group instruction.

4. The population of agriculture teachers is less likely to use microcomputer-related materials than are the teachers responding to this survey.

5. Microcomputers continue to be primarily used for planning and administration rather than for instructional purposes in programs of agriculture.

6. Agriculture teachers desire to increase their use of microcomputers for instructional purposes.

7. Although aware of the various types of new technology available for instruction, most programs of agriculture will focus on the use of video and microcomputer equipment in the next few years.

8. Although the technology is potentially available, data base information systems are not likely to be effectively utilized as sources of information in agricultural education in the next few years.

9. The use of satellite receivers in schools is limited and will not likely play a major role in instruction in agricultural education in the next few years.

10. Agriculture teachers desire to have a wide range of support materials available to supplement their instructional efforts.

11. The greatest barriers to the use of microcomputers in agriculture programs are a lack of expertise and limited available software.

12. Agriculture departments will not invest major resources ($100 or less) in a single type of instructional material (including microcomputer programs).

Recommendations

1. Agricultural educators should identify ways to overcome the barriers of limited funds which restrict the utilization of new educational technologies.

2. Inservice programs should be provided to develop instructor expertise needed to utilize new educational technologies.

3. Agricultural educators should develop a variety of relevant and up-to-date support materials as a part of future curriculum development projects.

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